

FIGURE 1

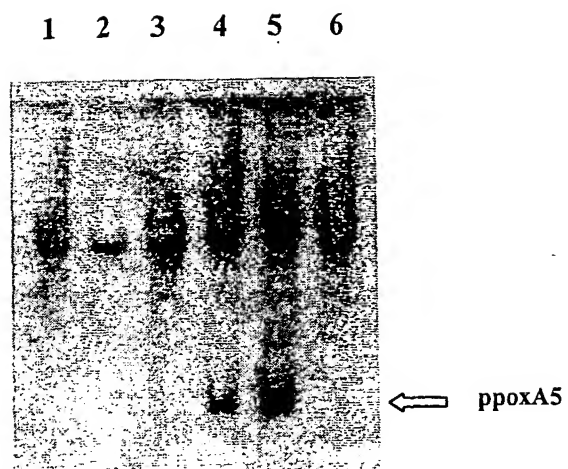


FIGURE 2

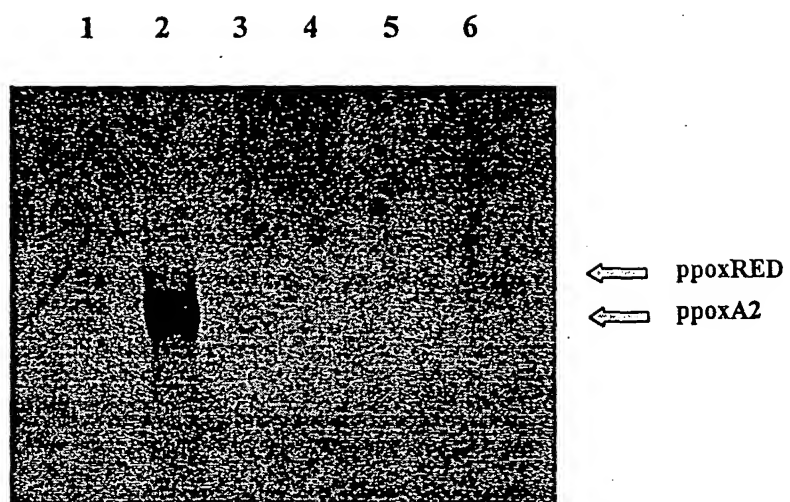


FIGURE 3

FIGURE 4

ppox-CYP52A2A

Sequence Range: 1 to 2631
POX4 promoter sequence underlined

<u>TATTTCCGGAGAAATATCGTTGGGGTAAACAACAGAGAGAGAGAGGGAGAGATGGTTCTGGTAGAATTATAATCTGGTT</u>	80
<u>GTTGCAAATGCTACTGATCGACTCTGGCAATGTCTGTAGCTCGCTAGTTGTATGCAACTTAGGTGTTATGCATACACAG</u>	160
<u>GTTATTCGGTTGAATTGTGGAGTAAAAATTGTCTGAGTTGTGTCCTAGCTACTGGCTGGCCCCCGCGAAAGATAATCAA</u>	240
<u>AATTACACTTGTGAATTTTGCACACACACCGATTAAACATTTCCCTTTTTTGTCCACCGATACACGCTTGCCTCTTCTTT</u>	320
<u>TTTTTCTCTGTGCTTCCCCCTCCTGTGACTTTTTCCACCATTGATATAAAATCAACTCCATTTCCCTAAATCTCCCCAG</u>	400
<u>ATTCTAAAAACAATTCTTCTCTTCTGCTTTTCCCTTTTTTTTGTATATTTATTTACCATCCCTTTTTTTTGAATAGTT</u>	480
<u>ATTCCCCACTAACATTGTTCAAATCTTCACGACATAATGACTGTACACGATATTATCGCCACATACTTCACCAAATGGTA</u>	560
CGTGATAGTACCACTCGCTTGATTGCTTATAGAGTCTCTGACTACTTCTATGGCAGATACTTGATGTACAAGCTTGGTG	640
CTAAACCATTTTTCCAGAAACAGACAGACGGCTGTTTCGGATTCAAAGCTCCGCTTGAATTGTTGAAGAAGAAGAGCGAC	720
GGTACCCTCATAGACTTCACACTCCAGCGTATCCACGATCTCGATCGTCCCGATATCCCACTTTCACATTCCCGGTCTT	800
TTCCATCAACCTTGTCAATACCCTTGAGCCGGAGAACATCAAGGCCATCTTGGCCACTCAGTTCAACGATTTCTCCTTGG	880
GTACCAGACACTCGCACTTTGCTCCTTTGTTGGGTGATGGTATCTTTACGTTGGATGGCGCCGGCTGGAAGCACAGCAGA	960
TCTATGTTGAGACCACAGTTTGCCAGAGAACAGATTTCCACGTCAGTTGTTGGAGCCACACGTTTCAGGTGTTCTTCAA	1040
ACACGTCAGAAAGGCACAGGGCAAGACTTTTGACATCCAGGAATTGTTTTTCAGATTGACCGTCGACTCCGCCACCGAGT	1120
TTTTGTTTGGTGAATCCGTTGAGTCCTTGAGAGATGAATCTATCGGCATGTCCATCAATGCGCTTGACTTTGACGGCAAG	1200
GCTGGCTTTGCTGATGCTTTTAACTATTTCGAGAAATTATTTGGCTTCGAGAGCGGTTATGCAACAATTGTACTGGGTGTT	1280
GAACGGGAAAAAGTTTAAGGAGTGCAACGCTAAAGTGACAAAGTTTGCTGACTACTACGTCAACAAGGCTTTGGACTTGA	1360
CGCTGAACAATTGGAAGAGCAGGATGGTTATGTGTTTTTGTACGAATTGGTCAAGCAAACCAGAGACAAGCAAGTGTG	1440
AGAGACCAATTGTTGAACATCATGGTTGCTGGTAGAGACACCACCGCGGTTTGTGTCGTTTGTCTTTTGAATTGGC	1520
CAGAAACCAGAAAGTTACCAACAAGTTGAGAGAAGAAATTGAGGACAAGTTTGGACTCGGTGAGAATGCTAGTGTGAAG	1600
ACATTTCTTTGAGTCGTTGAAGTCTGTGAATACTTGAAGGCTGTTCTCAACGAAACCTTGAGATTGTACCCATCCGTG	1680
CCACAGAATTTGAGAGTTGCCACCAAGAACAATACTACCTCCCAAGAGGTGGTGGTAAGGACGGGTGTCTCCTGTTTTGGT	1760
GAGAAAGGGTCAGACCGTTATTTACGGTGTCTACGCAGCCACAGAAACCAGCTGTTTACGGTAAGGACGCTCTTGAGT	1840
TTAGACCAGAGAGATGGTTGAGCCAGAGACAAAGAAGCTTGGCTGGGCCTTCTCCCATTCACGGTGGTCCAAGAATC	1920
TGTTTGGGACAGCAGTTTGCCTTGACAGAAGCTTCGTATGTCACTGTGAGGTGCTCCAGGAGTTTGACACTTGTCTAT	2000

FIGURE 4 (CONT'D)

GGACCCAGACACCGAATATCCACCTAAGAAAATGTCGCATTGACCATGTCGCTTTTCGACGGTGCCAATATTGAGATGT 2080
ATTAGAGGGTCATGTGTTATTTTGATTGTTTAGTTTGTAACTACTGATTAGGTTAATTCATGGATTGTTATTTATTGATA 2160
GGGGTTTGCGCGTGTTCATTCACTTGGGATCGTTCCAGGTTGATGTTTCCTTCCATCCTGTCGAGTCAAAAGGAGTTT 2240
GTTTTGTAACTCCGGACGATGTTTTAAATAGAAGGTCGATCTCCATGTGATTGTTTTGACTGTTACTGTGATTATGTAAT 2320
CTGCGGACGTTATACAAGCATGTGATTGTGGTTTTGCAGCCTTTGCACGACAAATGATCGTCAGACGATTACGTAATCT 2400
TTGTTAGAGGGGTAAAAAAAACAAAATGGCAGCCAGAATTTCAAACATTCTGCAAACAATGCAAAAAATGGGAAACTCC 2480
AACAGACAAAAAAAACCTCCGCAGCACTCCGAACCCACAGAACAATGGGGCGCCAGAATTATTGACTATTGTGACTTT 2560
TTTACGCTAACGCTCATTGCAGTGTAGTGCGTCTTACACGGGTATTGCTTTCTACAATGCAAGGGCACAG 2630

FIGURE 5

ppox-CYP52A5A

Sequence Range: 1 to 2652

POX4 promoter sequence underlined

<u>TATTCGGGAGAAATATCGTTGGGGTAAACAACAGAGAGAGAGAGGGGAGAGATGGTTCGGTAGAATTATAATCTGGTT</u>	80
<u>GTTGCAAATGCTACTGATCGACTCTGGCAATGTCTGTAGCTCGCTAGTTGTATGCAACTTAGGTGTTATGCATACACAG</u>	160
<u>GTTATTCGGTTGAATTGTGGAGTAAAAATTGTCTGAGTTGTGTCTTAGCTACTGGCTGGCCCCCGCGAAAGATAATCAA</u>	240
<u>AATTACACTTGTGAATTTTGCACACACACCGATTAAACATTTCCCTTTTTTGTCCACCGATACACGCTTGCCTCTTCTTT</u>	320
<u>TTTTTCTCTGTGCTTCCCCCTCCTGTGACTTTTTCCACCATTGATATAAAATCAACTCCATTTCCCTAAAATCTCCCCAG</u>	400
<u>ATTCTAAAAACAATTCTTCTCTTCTGCTTTTCTTTTTTTTGTATATTATTACCATCCCTTTTTTTGAATAGTT</u>	480
<u>ATTCCCCACTAACATTGTTCAAATCTTCACGACATAATGATTGAACAACTCCTAGAATATTGGTATGTCGTGTGCCAGT</u>	560
GTTGTACATCATCAACAACCTCCTGCATACACAAGACTCGCGTCTTGATGAAAAGTTGGGTGCTGCTCCAGTCACAA	640
ACAAGTTGTACGACAACGCTTTCGGTATCGTCAATGGATGGAAGGCTCTCCAGTTCAGAAAGAGGGCAGGGCTCAAGAG	720
TACAACGATTACAAGTTTGACCACTCCAAGAACCCAGCGTGGGCACCTACGTCAGTATTCTTTTCGGCACCAGGATCGT	800
CGTGACCAAAGATCCAGAGAATATCAAAGCTATTTTGGCAACCCAGTTTGGTGATTTTCTTTGGGCAAGAGGCACACTC	880
TTTTTAAGCCTTTGTTAGGTGATGGGATCTTCACATTGGACGGCGAAGGCTGGAAGCACAGCAGAGCCATGTTGAGACCA	960
CAGTTTGCCAGAGAACAAGTTGCTCATGTGACGTCGTTGGAACCACACTCCAGTTGTTGAAGAAGCATATTCTTAAGCA	1040
CAAGGGTGAATACTTTGATATCCAGGAATTGTCTTTAGATTTACCGTTGATTCGGCCACGGAGTTCTTATTGGTGAGT	1120
CCGTGCACTCCTTAAAGGACGAATCTATTGGTATCAACCAAGACGATATAGATTTTGCTGGTAGAAAGGACTTTGCTGAG	1200
TCGTTCAACAAAGCCCAGGAATACTTGCTATTAGAACCTTGGTGACAGCTTCTACTGGTTGGTCAACAACAAGGAGTT	1280
TAGAGACTGTACCAAGCTGGTGACAAGTTCAACCACTACTATGTTCAGAAAGCTTTGGATGCTAGCCAGAAGAGCTTG	1360
AAAAGCAAAGTGGGTATGTGTTCTTGTACGAGCTTGTCAAGCAGACAAGAGACCCCAATGTGTTGCGTGACCAGTCTTTG	1440
AACATCTTGTTGGCCGAAGAGACACCACTGCTGGGTTGTGTGCTTTGCTGTCTTTGAGTTGGCCAGACACCCAGAGAT	1520
CTGGGCCAAGTTGAGAGAGGAAATTGAACAACAGTTTGGTCTTGGAAGACTCTCGTGTGAAGAGATTACCTTTGAGA	1600
GCTTGAAGAGATGTGAGTACTTGAAGCGTTCCTTAATGAAACCTTGCGTATTTACCCAAGTGTCCTCAAGAACTTCAGA	1680
ATCGCCACCAAGAACACGACATTGCCAAGGGGCGGTGGTTCAGACGCTACCTCGCCAATCTTGATCCAAAAGGGAGAAGC	1760
TGTGTCGTATGGTATCAACTCTACTCATTGACCTGTCTATTACGGCCCTGATGCTGCTGAGTTCAGACCAGAGAGAT	1840
GGTTTGAGCCATCAACCAAAAAGCTCGGCTGGGCTTACTTGCCATTCAACGGTGGTCCAAGAATCTGTTTGGGTGAGCAG	1920
TTTGCCTTGACGGAAGCTGGCTATGTGTTGGTTAGATTGGTGCAAGAGTTCTCCACGTTAGGCTGGACCCAGACGAGGT	2000
GTACCCGCCAAAGAGGTTGACCAACTTGACCATGTGTTTGAGGATGGTGCTATTGTCAAGTTTGACTAGCGGCGTGGTG	2080
AATGCGTTTGATTTGTAGTTTCTGTTTGAGTAATGAGATAACTATTAGATAAGGCGAGTGGATGTACGTTTGTAAAG	2160
AGTTTCCTTACAACCTTGGTGGGGTGTGTGAGGTTGAGGTTGCATCTTGGGGAGATTACACCTTTTGCAGCTCTCCGTAT	2240

FIGURE 5 (CONT'D)

ACACTTGACTCTTTGTAACCTCTATCAATCATGTGGGGGGGGGGTTCAATTGTTGGCCATGGTGGTGCATGTTAAATC	2320
CGCCAACTACCCAATCTCACATGAAACTCAAGCACACTAAAAAAAAAAGATGTTGGGGGAAAACTTTGGTTTCCCTTC	2400
TTAGTAATTAAACACTCTCACTCTCACTCTCTCTCCACTCAGACAAACCAACCCTGGGCTGCAGACAAACCAGAA	2480
AAAAAAAAAGAACAAATCCAGATAGAAAAACAAAGGCTGGACAACCATAAATAACAATCTAGGGTCTACTCCATCTTCC	2560
ACTGTTTCTTCTTCTTCAGACTTAGCTAACAAACAÄCTCACTTCACCATGGATTACGCAGGCATCACGCGTGGCTCCATC	2640
AGAGGCGAGGCC	2650

FIGURE 6

ppox-NCP1B

Sequence Range: 1 to 3073

POX4 promoter sequence underlined

<u>TATTTCCGGAGAAAATATCGTTGGGGTAAAACAACAGAGAGAGAGAGGGAGAGATGGTTCTGGTAGAATTATAATCTGGTT</u>	80
<u>GTTGCAAATGCTACTGATCGACTCTGGCAATGTCTGTAGCTCGCTAGTTGTATGCAACTTAGGTGTTATGCATACACAGC</u>	160
<u>GTTATTCGGTTGAATTGTGGAGTAAAAATTGTCTGAGTTGTGTCTTAGCTACTGGCTGGCCCCCGGAAAGATAATCAA</u>	240
<u>AATTACACTTGTGAATTTTGCACACACACCGATTAAACATTTCCCTTTTTTGTCCACCGATACACGCTTGCCCTCTTCTTT</u>	320
<u>TTTTTCTCTGTGCTTCCCCCTCTGTGACTTTTTTCCACCATTGATATAAAATCAACTCCATTCCCTAAATCTCCCCAG</u>	400
<u>ATTCTAAAAACAATTCTTCTCTTCTGCTTTTTCTTTTTTTTTGTTATATTTATTTACCATCCCTTTTTTTGAATAGTT</u>	480
<u>ATTCCCCACTAACATTGTTCAAACTCTCACGACATAATGGCTTAGACAAGTTAGATTTGTATGTATCATAACATTGGT</u>	560
GGTCGCTGTGGCCGCCTATTTTGCTAAGAACCAGTTCCTTGATCAGCCCCAGGACACCGGTTCTCAACACGGACAGCG	640
GAAGCAACTCCAGAGACGTCTTGCTGACATTGAAGAAGAATAATAAAAAACAGTTGTTGTTGTTGGGTCCCAGACCGGT	720
ACGGCAGAAGATTACGCCAACAAATTGTCAAGAGAATTGCACTCCAGATTTGGCTTGAAAACCATGGTTGCAGATTTCCG	800
TGATTACGATTGGGATAACTTCGGAGATATCACCGAAGATATCTTGGTGTTTTTCATCGTTGCCACCTACGGTGAGGGTG	880
AACCTACCGACAATGCCGACGAGTTCCACACCTGGTTGACTGAAGAAGCTGACACTTTGAGTACTTTGAGATATACCGTG	960
TTCCGGTTGGGTAACCTCCACCTACGAGTTCTTCAATGCTATTGGTAGAAAGTTTGACAGATTGTTGAGTGAGAAAGTG	1040
TGACAGATTGCTGAATATGCTGAAGGTGACGACGGCACTGGCACCTTGACGAAGATTTGATGGCTGGAAGGATAATG	1120
TCTTTGACGCCTTGAAGAATGACTTGAACCTTGAAGAAAAGGAATTGAAGTACGAACCAACCGTGAATTTGACTGAGAGA	1200
GATGACTTGTCTGCTGCCGACTCCCAAGTTTCTTGGGTGAGCCAAACAAGAAGTACATCAACTCCGAGGGCATCGACTT	1280
GACCAAGGGTCCATTGACCACACCCACCCATACTTGGCCAGGATCACCGAGACCAGAGATTGTTTCAGCTCCAAGGAAA	1360
GACACTGTATTACGTTGAATTTGACATTTCTGAATCGAACTTGAATAACACCACCGGTGACCATCTAGCCATCTGGCCA	1440
TCCAACCTCCGACGAAAACATCAAGCAATTTGCAAGTGTTTCGGATTGGAAGATAAACTCGACACTGTTATTGAATTGAA	1520
GGCATTGGACTCCACTTACACCATTCATTTCCCAACTCCAATTACTTACGGTGCTGTATTAGACACCATTTAGAAATCT	1600
CCGGTCCAGTCTCGAGACAATTCTTTTTGTGCGATTGCTGGGTTTGCTCCTGATGAAGAAACAAGAAGACTTTACCAGA	1680
CTTGGTGGTGACAAACAAGAATTGCGCACCAAGGTTACCCGAGAAAGTTCAACATTGCCGATGCCTTGTTATATTCTC	1760
CAACAACACTCCATGGTCCGATGTTCTTTTGTGAGTTCTTATTGAAAACATCCAACACTTGACTCCACGTTACTACTCCA	1840
TTTCTTCTTCGTCGTTGAGTGAAAAACAACCTCATCAATGTTACTGCACTGCTTGAGGCCGAAAGAAGCCGATGGCAGA	1920
CCAGTCACTGGTGTGTTACCAACTTGTGAAGAACATTGAAATTGCGCAAAACAAGACTGGCGAAAAGCCACTTGTTCA	2000
CTACGATTTGAGCGGCCCAAGAGGCAAGTTCAACAAGTTCAAGTTGCCAGTGACGTGAGAAGATCCAACTTTAAGTTGC	2080
CAAAGAATCCACCACCCAGTTATCTTGATTGGTCCAGTACTGGTGTGCCCCATTGAGAGGTTTCGTTAGAGAAAGA	2160
GTTCAACAAGTCAAGAATGGTGTCAATGTTGGCAAGACTTTGTTGTTTTATGGTTGCAGAACTCCAACGAGGACTTTTT	2240

FIGURE 6 (CONT'D)

GTACAAGCAAGAATGGGCCGAGTACGCTTCTGTTTTGGGTGAAAACCTTTGAGATGTTCAATGCCTTCTCTAGACAAGACC	2320
CATCCAAGAAGGTTTACGTCCAGGATAAGATTTTAGAAAACAGCCAACTTGTGCACGAATTGTTGACCGAAGGTGCCATT	2400
ATCTACGTCTGTGGTGACGCCAGTAGAATGGCCAGAGACGTCCAGACCACGATCTCCAAGATTGTTGCCAAAAGCAGAGA	2480
AATCAGTGAAGACAAGGCCGCTGAATTGGTCAAGTCCTGGAAAGTCCAAATAGATACCAAGAAGATGTTTGGTAGACTC	2560
AAACGAATCTCTCTTTCTCCCAACGCATTTATGAATATTCTCATTGAAGTTTTACATATGTTCTATATTTTCAATTTTTTT	2640
TTATTATATTACGAAACATAGGTCAACTATATATACTTGATTAAATGTTATAGAAACAATAATTATTATCTACTCGTCTA	2720
CTTCTTTGGCATTGGCATTGGCATTGGCATTGGCGTTGCCGTTGGTAATGCCGGGATATTTAGTACAGTATCTC	2800
CAATCCGGATTTGAGCTATTGTAAATCAGCTGCAAGTCATTCTCCACCTTCAACCAGTACTTATACTTCATCTTTGACTT	2880
CAAGTCCAAGTCATAAATATTACAAGTTAGCAAGAACTTCTGGCCATCCACAATATAGACGTTATTCACGTTATTATGCG	2960
ACGTATGGATATGGTTATCCTTATTGAACTTCTCAAACCTTCAAAAACAACCCACGTCCTCGCAACGTCATTATCAACGAC	3040
AAGTTCTGACTCACGTCGTCGGAGCTCGTCAAG	3070

FIGURE 7

Strain Comparison (7-25-01)

Reductase Assays

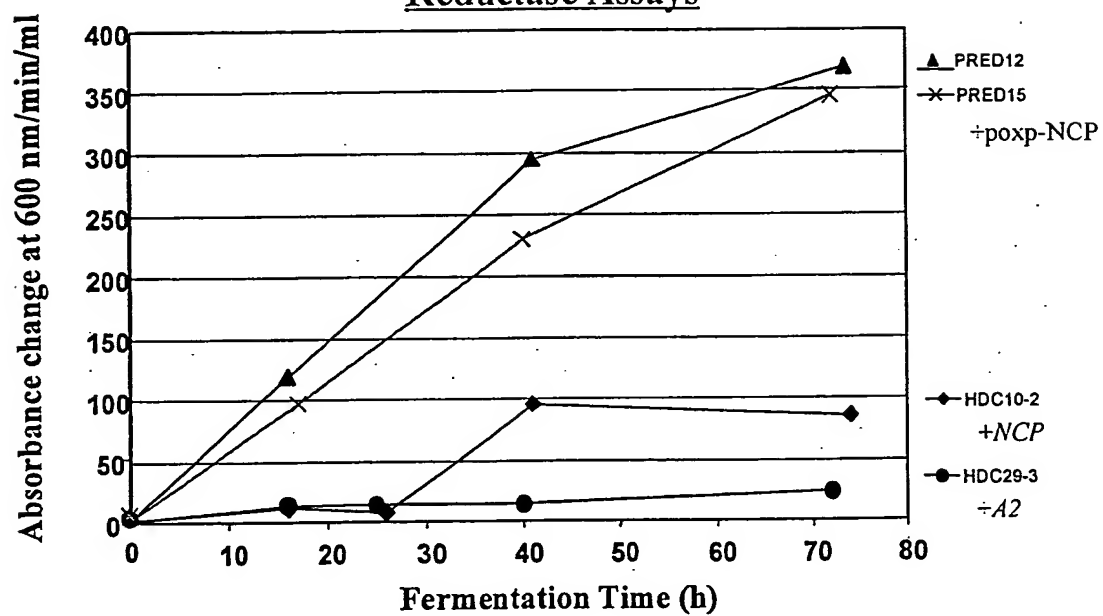
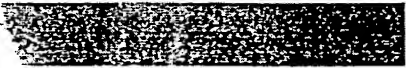




FIGURE 8

Strain	Modification	Western blot
H5343	-	
HDC10-2	<i>NCP1B</i>	
PR 12	Pox_ NCP1B*	

Western blot using reductase specific antibody: Significantly more reductase induced in the pox-gene fusion strain during fermentation.

FIGURE 9

